

Claims

1 1. An accelerometer, comprising:
2 a measurement mass for detecting acceleration, including a housing
3 having a cavity, a spring mass assembly positioned within the
4 cavity, and one or more metal electrode patterns coupled to the
5 spring mass assembly;
6 a top cap wafer coupled to the measurement mass, including a top
7 capacitor electrode, a top cap balanced metal pattern, a top cap
8 press frame recess, and top cap overshock bumpers; and
9 a bottom cap wafer coupled to the measurement mass, including a
10 bottom capacitor electrode, a bottom cap balanced metal pattern,
11 a bottom cap press frame recess, and bottom cap overshock
12 bumpers.

1 2. An accelerometer, comprising:
2 a measurement mass for detecting acceleration, including a housing
3 having a cavity, a spring mass assembly positioned within the
4 cavity, one or more metal electrode patterns coupled to the
5 spring mass assembly, and one or more passages for venting air
6 from the cavity in the housing.;
7 a top cap wafer coupled to the measurement mass, including a top
8 capacitor electrode, a top cap balanced metal pattern, a top cap
9 press frame recess, and top cap overshock bumpers;
10 a bottom cap wafer coupled to the measurement mass, including a bottom
11 capacitor electrode, a bottom cap balanced metal pattern,
12 a bottom cap press frame recess, and bottom cap overshock
13 bumpers.

1 3. A method of fabricating an accelerometer, comprising:
2 fabricating a measurement mass for detecting acceleration that includes a
3 housing having a cavity, and a spring mass assembly positioned
4 within the cavity;
5 fabricating a top cap wafer;
6 fabricating a bottom cap wafer;
7 vertically stacking the measurement mass, the top cap wafer, and the
8 bottom cap wafer in an approximately parallel manner;
9 bonding the top cap wafer to a side of the measurement mass using a
10 bonding process;
11 bonding the bottom cap wafer to another side of the measurement mass
12 using the bonding process; and
13 making one or more dicing cuts at predetermined locations on the
14 accelerometer.

1 4. A method of bonding an accelerometer, comprising:

2 fabricating a measurement mass that includes a housing having a

3 cavity, a spring mass assembly positioned within the cavity, and

4 one or more bond rings coupled to the housing;

5 fabricating a top cap wafer that includes a top bond ring and a top

6 cap press frame recess;

7 fabricating a bottom cap wafer that includes a bottom bond ring

8 and a bottom cap press frame recess;

9 vertically stacking the measurement mass, the top cap wafer, and the

10 bottom cap wafer in an approximately parallel manner;

11 bonding the top cap wafer to a side of the measurement mass using a

12 bonding process; and

13 bonding the bottom cap wafer to another side of the measurement mass

14 using the bonding process.

1 5. A method of shaping a wafer to create components for a sensor,
2 comprising:

3 applying an etch-masking layer and an etch-stop layer to the wafer;
4 patterning the etch-masking layer to create an area of exposure in the
5 etch-masking layer;
6 applying one or more etching agents to the area of exposure to remove
7 the etch-masking layer within the area of exposure;
8 applying one or more etching agents to the area exposure to shape the
9 wafer into a housing, a measurement mass, and one or more
10 springs down to the etch-stop layer; and
11 maintaining the etch-stop layer on the springs.

1 6. A sensor, comprising:
2 a measurement mass assembly including a housing, a measurement
3 mass including one or more electrodes, and a plurality of springs
4 for coupling the measurement mass to the housing;
5 a top cap wafer coupled to the measurement mass assembly including a
6 top cap overshock bumper pattern designed to reduce
7 stiction within the sensor; and
8 a bottom cap wafer coupled to the measurement mass assembly
9 including a bottom cap overshock bumper pattern designed to
10 reduce stiction within the sensor.

1 7. A metal electrode pattern for use in a sensor, comprising:
2 a metal electrode including a stiction-reducing pattern.

1 8. A method of creating a stiction-reducing metal electrode pattern for use
2 within a sensor, comprising:
3 etching a surface pattern onto a surface of the sensor;
4 applying a metal layer to the surface of the sensor including the surface
5 pattern; and
6 molding the metal layer to create the stiction-reducing metal electrode
7 pattern.

1 9. A method of creating a metal electrode pattern including reduced-
2 thickness recesses for reducing stiction between the metal electrode
3 pattern and overshock bumpers within an accelerometer, comprising:
4 creating a lower metal electrode pattern layer;
5 applying an upper metal electrode pattern layer on top of the lower
6 metal electrode pattern layer; and
7 selectively removing one or more portions of the upper metal electrode
8 pattern layer to create the reduced-thickness recesses and expose
9 the underlying lower metal electrode pattern layer within the
10 metal electrode pattern.

1 10. A method of creating a metal electrode pattern including cavities for
2 reducing stiction between the metal electrode pattern and overshock
3 bumpers within an accelerometer, comprising:
4 creating a lower metal electrode pattern layer;
5 applying an upper metal electrode pattern layer on top of the lower
6 metal electrode pattern layer; and
7 selectively removing one or more portions of the upper metal electrode
8 pattern layer and the lower metal electrode pattern layer to
9 create the cavities within the metal electrode pattern.

1 11. A method of creating a metal electrode pattern including reduced-
2 thickness recesses for reducing stiction between the metal electrode
3 pattern and overshock bumpers within an accelerometer, comprising:
4 creating a metal electrode pattern; and
5 selectively removing one or more portions of the metal electrode
6 pattern to create the reduced-thickness recesses and expose
7 an underlying layer of the metal electrode pattern.

1 12. A method of creating a metal electrode pattern including cavities for
2 reducing stiction between the metal electrode pattern and overshock
3 bumpers within an accelerometer, comprising:

- 4 creating a metal electrode pattern; and
- 5 selectively removing one or more portions of the metal electrode
- 6 pattern to create the cavities.

add A1

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